

# PATENT SPECIFICATION

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## (54) THIN-WALLED CONTAINERS

(71) We, ILLINOIS TOOL WORKS INC., a corporation organised and existing under the laws of the State of Delaware, United States of America, of 8501 West Higgins Road, Chicago, Illinois, 69631, United States of America, do hereby declare the invention, for which we pray that a patent may be granted to us and the method by which it is to be performed, to be particularly described in and by the following statement:—

There are conventional plastics and glass jars and bottles with integral threads which enable one to secure and seal a threaded cap thereon. To provide adequate strength in the threads, the wall thickness and consequent weight are considerable. Also, there are containers of various types having separate threaded members of various types secured thereto. In some of these types, as where plastics materials are employed, there is a mould formation of the parts with a welding of the materials of the container and threaded members; in others, there is mechanical interlocking between the container and the threaded member.

According to the present invention a container comprises a thin-walled plastics body having an open neck portion, and an annular ring member more rigid than the neck portion trapped around the neck portion by means including a portion of the body wall expanded to immediately underlie the adjacent bottom edge of the ring member, the ring member having an external shape capable of interengagement with a removable cap.

By the use of this invention in particular ways, a ring member may be mechanically trapped around the body neck against axial or rotational movement relative thereto, such as by interfitment between the neck material and one or more recesses interiorly of the ring member, or by entrapment of the ring member between a portion of the body

wall and a flange rim at the top of the neck, such flange rim serving also as a sealing surface for an applied closure cap.

The invention is principally intended for use in containers to receive caps having a continuous screw thread, but may also be applied to containers to receive caps having an interrupted screw thread, or having lugs for snap engagement with the ring member. In this last case substantial resistance against relative rotation of the ring member and container body is not needed.

Preferably a container is made by a method including the steps of providing a thin-walled plastics body preform with an open neck portion, assembling around the neck portion a preformed ring member more rigid than the neck portion, having an external shape capable of interengagement with a removable cap, and re-shaping the preform by expansion of the neck portion into snug engagement with the ring member and expansion of the remainder of the preform to position a portion thereof in underlying engagement with the bottom edge of the ring member.

The accompanying drawings show one example of a container embodying the invention and the method by which it is made. In these drawings:—

Figure 1 is an exploded view showing the container body preform and the ring member prior to assembly:

Figure 2 is a side view, partly in section, showing the assembled preform and ring member;

Figure 3 is a side elevation of the assembled ring member and body after reshaping of the preform of Figure 2; and

Figure 4 is an enlarged fragmentary section showing the interlocking of the body wall and ring member and a closure cap applied thereto.

Reference will first be made to Figures 3 and 4 for a description of the container,

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which includes a thin-walled body 10 and a ring member 18 assembled thereto. The upper part of the side wall of the body is domed inwards, at 12, to underlie the bottom edge of the ring member and to merge with a neck portion 14 having at the upper end thereof an outward flange 16 which overlies the upper edge of the ring member. The ring member 18 is considerably more rigid than the neck portion 14. The outer surface of the ring member 18 has threads 20 for cooperation with similar threads on the depending skirt 22 of a closure cap 24. The cap includes a peripheral portion 26, the undersurface of which makes sealing engagement with the flange 16 when the container is closed. As particularly shown in Figure 4, the ring member 18 is trapped between the domed wall part 12 and the undersurface of the flange 16. In forming the ring member 18, as by injection moulding, a thread-like recess 21 is formed on the inner surface thereof in complement to the external threads 20, and upon assembly of the ring member to the neck 14, portions 15 of the neck are forced into interengagement with the recess 21 as described in more detail below. In conjunction with the wall part 12 and flange 16, this recess 21 interlocks the neck portion and the ring member against relative rotation despite the torques arising when the cap 24 is applied or removed.

Turning to Figures 1 and 2, the method of assembly of the ring member to the body will be described. The material for the container body is selected from those plastics materials, as polystyrene, which can be blown, or thermoformed from sheet, to thin wall thicknesses for light weight but which then may be of insufficient strength to provide integral thread formations for proper securing of a closure cap thereto. Thus, as shown in Figure 1, the material of the container body is shaped to a body preform with an inverted frusto-conical main portion 10a and an upper cylindrical portion 14a which is to become the neck portion 14, with a flange 16a projecting radially outwards around the open end. The ring member 18 is relatively thick and rigid and may be of nylon, or even metal, for sufficient rigidity to threadedly receive a closure cap. This ring member is telescopically associated with the preform to the position shown in Figure 2, around the cylindrical portion 14a, and in abutment with the undersurface of the flange 16a. It will be noted that the recess 21 faces the outer surface of the body wall 14a. It is to be understood that alternatively one or more internal recesses of shape other than complementary to the threads 20 may be formed during moulding or otherwise forming the ring member.

At the assembly stage of Figure 2, the parts are associated with suitable apparatus for heating, reblowing or thermo-forming the preform to reshape it to the configuration of Figure 3, with the domed wall part 12 underlying the bottom edge of the ring member, as particularly shown in Figure 4, to trap the ring member between this domed part and the undersurface of the flange 16. At the same time, the material of the neck portion 14a will be forced outwardly at 15, into locking engagement with the recess 21, or such other recess configurations as may be provided on the inner surface of the ring member. There is thus provided a composite container including a thin-walled and light-weight body and a relatively rigid threaded ring member serving to reinforce the body neck and provide firm purchase for a closure, independent of the material selected for the body portion.

As an example, polystyrene for the body portion is relatively inexpensive and easily blown into a thin-walled container, e.g. with a wall thickness in the range 0.015 inch to 0.025 inch. Polystyrene is of sufficient resiliency such that the flange 16 provides a resilient sealing surface for the applied closure cap which may itself be formed of relatively rigid polyethylene to cooperate with the threads on the ring member. If the preform is made by a sheet forming process, the flange 16 has the same thickness as the wall; if the preform is made by injection moulding, the flange 16 has a thickness of about 0.030 inch. For the material of the body preform, the temperature required for reblowing or other thermo-forming may be in the neighbourhood of 250° F and the material of the ring member, if of a plastics, such as nylon, is selected to withstand a higher temperature, as in the neighbourhood of 350° F, without degradation. Thus, the reshaping of the body preform can be accomplished without affecting the material of the ring member, which may serve as a part of the mould surface in reshaping the body, particularly the neck portion thereof, against the ring member. The expansion of the side wall, particularly the domed portion, snugs the ring member against the undersurface of the flange.

The shape of the recess 21, or equivalent recess or recesses, should be such that air can escape, to enable the material of the neck to fully enter the recess during the reshaping operation.

#### WHAT WE CLAIM IS:—

1. A container comprising a thin-walled plastics body having an open neck portion, and an annular ring member more rigid than the neck portion trapped around the neck portion by means including a portion of the

body wall expanded to immediately underlie the adjacent bottom edge of the ring member, the ring member having an external shape capable of interengagement with a removable cap. 45

5. A container according to claim 1, wherein the ring member has one or more internal recesses interfitted with complementary expanded surface parts on the neck portion. 50

10. 3. A container according to claim 1 or claim 2, wherein the neck portion has an outward flange around the open end thereof in cooperative trapping engagement with the adjacent upper edge of the ring member. 55

15. 4. A container according to claim 3, wherein the flange around the neck portion is sufficiently flexible to provide a seal between the ring member and an applied cap. 60

20. 5. A container according to any of claims 1 to 4, wherein the external shape of the ring member includes threads capable of interengagement with a threaded cap. 65

25. 6. A method of making a container, including the steps of providing a thin-walled plastics body preform with an open neck portion, assembling around the neck portion a preformed ring member more rigid than the neck portion, having an external shape capable of interengagement with a removable cap, and re-shaping the preform by expansion of the neck portion into snug engagement with the ring member and expansion of the remainder of the preform to position a portion thereof in underlying engagement with the bottom edge of the ring member. 70

30. 7. A method according to claim 6, wherein re-shaping of the preform is by 75

35. 40.

thermo-forming, and the material of the ring member is selected to be unaffected by the heat involved, thus permitting the ring member to serve as a mould surface against which the preform is expanded.

8. A method according to claim 7, wherein the inner surface of the preformed ring member has one or more recesses with which the expanded material of the neck portion is interlocked.

9. A method according to any of claims 6 to 8, wherein the neck portion of the preform has an outward flange around the open end thereof, and in the assembling step the ring member is brought into engagement with the flange.

10. The method according to claim 9, wherein the side wall of the preform is initially tapered inwards and downwards from the neck portion, permitting assembly of the ring member around the neck portion by telescopic association of the ring member along the preform.

11. A method according to any of claims 6 to 10, wherein the external shape of the ring member includes threads capable of interengagement with a threaded cap.

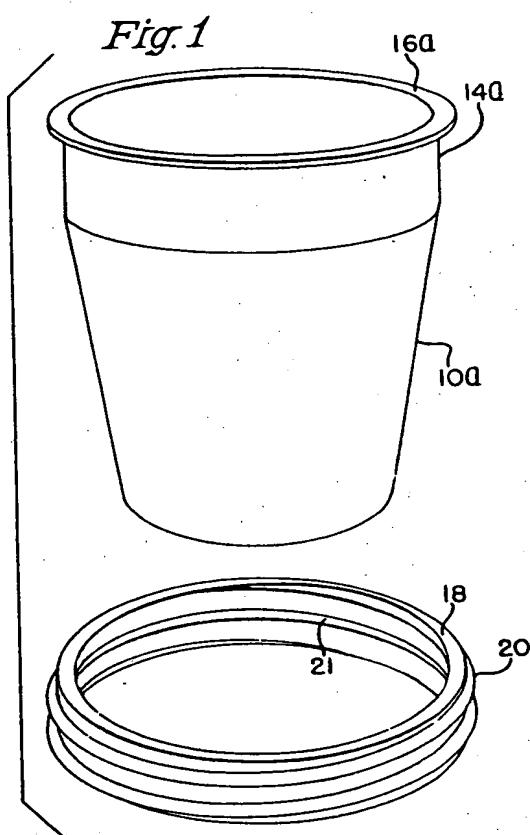
12. A container according to claim 1, substantially as described with reference to Figures 3 and 4 of the accompanying drawings.

13. A method according to claim 6, substantially as described with reference to Figures 1 to 4 of the accompanying drawings.

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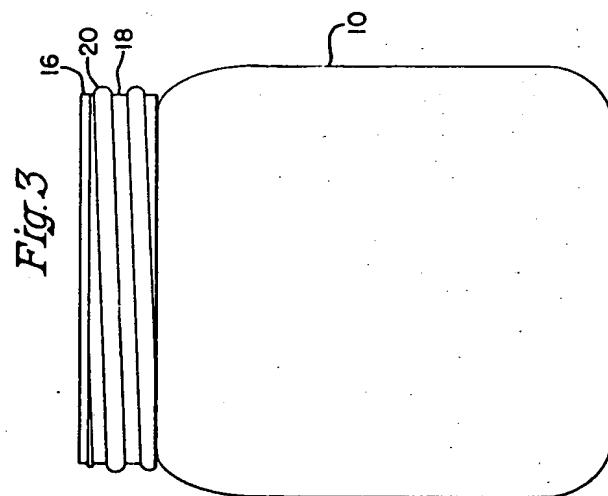
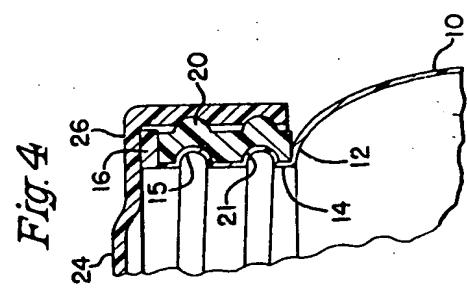
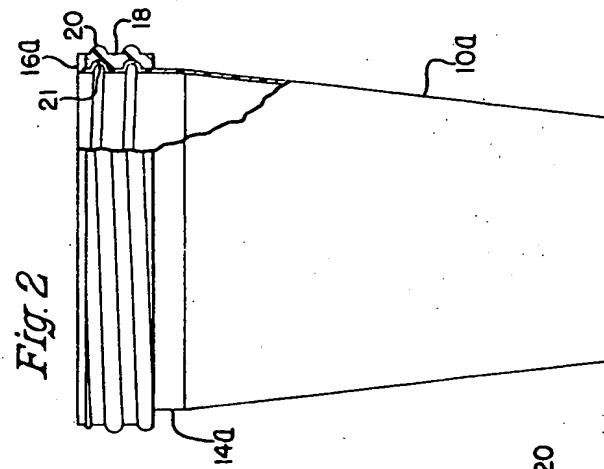
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Sheet 2



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**ERRATUM**

**SPECIFICATION No. 1,405,061**

Page 1, line 5, *delete 69631 insert 60631*  
**THE PATENT OFFICE**  
*30th March, 1976*

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